

however, these symptoms disappeared, and from that time to this the neuralgia has not returned."

Dr. Wood relates several other cases in which he resorted to this method of treatment with advantage. He has satisfied himself, however, that in those not unfrequent cases where the disease has a central, not a centripetal origin, it is quite useless.

The following are the conclusions at which Dr. Wood has arrived from his experience with this mode of treatment.

"1st. That narcotics injected into the neighbourhood of the painful point of a nerve affected with neuralgia, will diminish the sensibility of that nerve, and in proportion diminish or remove pain.

"2d. That the effect of narcotics so applied are not confined to their local action, but that they reach the brain through the venous circulation, and there produce their remote effects.

"3d. That in all probability what is true in regard to narcotics would be found to be equally true in regard to other classes of remedies.

"4th. That the small syringe affords a safe, easy, and almost painless method of exhibition.

"5th. That, destitute as we are of any precise experiments as to the applicability of cellular tissue as a medium for the reception of medicinal agents, the experiments made with the syringe show that it seems to offer an excellent surface for the absorbent action of the venous system.

"6th. That the method now detailed seems as extensively applicable as any of the methods of applying remedies to the skin, whether epidermic, intra-leptic, endermic, or by inoculation."

27. *Treatment of Cholera in the Stage of Collapse, by the Artificial Production of Peritoneal or Cellular Dropsy.* By BENJ. W. RICHARDSON, M.D.—We extract the following remarks on this subject from a paper in the *Association Medical Journal*:—

"The more I have considered the matter, the more thoroughly have I been confirmed in favour of the now generally received opinions, that the symptoms of collapse are due to the loss of fluid which the body has sustained; that the poison of cholera, like a dose of a violent purgative, has a limit to its action on the body; and that if a patient can sustain the loss caused by the dose of the poison he has received, or if he can be sustained artificially from that loss, his recovery is to a great degree secured.

"A rapid removal of fluid must not always be considered in regard to quantity, because all physiological learning goes to prove that a certain balance between the densities of arterial and of venous blood must be kept up, to secure for the system many processes upon which its existence directly depends.

"Now, in cholera, as the serous loss must be derived mainly from the arterial circuit, it is obvious that a very few copious discharges from the stomach or intestines lead quickly to the destruction of the balance that ought to exist, speedily arrest the course of the circulation, and of necessity interfere with the respiratory process, the generation of animal heat, the function of the nervous system, so far as they depend on the blood, and with every other process which we consider essentially vital. . . . Now, in observing a patient in the collapsed state of cholera, . . . one sees at once why so much of incessant failure attends many of those remedial measures which are commonly adopted.

"Thus we see that the application of external warmth over and above the natural animal temperature, and for the purpose of increasing the heat of the patient, is a proceeding at once useless and unphilosophical; since the body does not absorb caloric from without, but makes it from within, and diffuses it externally. And, as the coldness of cholera arises solely from the fact that the internal chemical process, by which heat is produced, is arrested, it is obvious that the only means by which a new supply of heat can be obtained, will be by endeavouring to rekindle the natural calorifying influence. It is of course strictly physiological to surround the body of a cholera patient with a temperature somewhat above the ordinary point of animal heat, or by a non-conducting material; for this is a conservative step, tending to retain such small amount

of caloric as may be generated within; but to do more—to heat the atmosphere of the room, to shut off currents of fresh air, without which respiration is a nullity—is a system directly opposed to our knowledge of first physiological laws.

“Again, no one who has observed cholera much, can fail to be convinced of the frequent inutility of drenching a patient with large amounts of simple liquids or medicines, during such times as copious vomiting and purging are going on. For there can be little or no absorption by a membrane, at a time when it is pouring out excreted matters from every point of its surface; nor can we suppose that, even in the last stages of the disease, when from sheer want of fluid to exude, the watery evacuations have ceased, the membrane from which they have all proceeded, and of whose epithelium immense portions have been washed away, is in a very happy condition for the imbibition of substances, medicinal or otherwise. And, indeed, we find in practice that even the most powerful styptic remedies prove of little avail in arresting the discharge, unless given in that early stage of the disease, when their retention is secured.

“As, then, the loss of fluid from the system is the cause of the collapse, as in many cases it cannot be replaced by the natural process of imbibition from the intestinal surface, and as the blood cannot circulate and reaction occur, without such replacement, there is open before us these plain and simple physiological problems. Are there any other means by which fluid can be introduced into the exhausted circulation? and, if so, which of these is the safest, and most calculated to effect the object desired?

“We have seen that the mucous membrane of the alimentary canal, while carrying on an extensive excretory process, cannot invariably be made a medium for absorbing fluid to any great extent. Some practitioners have, however, believed that the administration of large quantities of fluid by the mouth, during the intervals of rest from vomiting, has been attended with benefit; and there surely can be no objection to a plan so reasonable, unless the swallowing process should itself excite vomiting, and especially as patients themselves almost invariably crave urgently for drink.

“The most important step that has as yet been made on the human subject towards supplying the exhausted system with fluids, in cholera, is that of throwing a considerable quantity of fluid directly into the circulation through the veins; and it cannot be denied that, in practice, this plan has been attended with some amount of success. That it should not be generally successful is, I think, strictly explainable on physiological grounds. In the first place, the plan is objectionable on the mechanical argument, that to throw a large amount of fluid through a vein directly into a heart itself exhausted, is sufficient to paralyze that organ to a serious degree; for I have found, by direct experiment, that a weakened heart often succumbs instantly from over-distending it with blood itself.

“Another objection to the direct transfusion of water, or of water impregnated with saline or other materials, into the circulation, is, that such fluid is not the proper stimulus for exciting the heart to contraction; and that, even if the heart does contract upon it, and throws it round the pulmonic circuit, it is, again, not a substance upon which the process of respiration can properly act. When a saline substance, injected into a vein, accomplishes anything, it does so, I imagine, by dissolving the half-clotted blood in the cardiac cavities, and by carrying the blood, thus diluted, round the lungs.

“But the last and main obstacle to the success attending injection into a vein is, that by this process no such competent amount of fluid can be introduced so as to produce a permanent effect; and, in truth, we too often find in practice that, after such injection, the patient only rallies for a brief period, to sink again under a continuance of the discharge from the intestines. I do not know what is the largest amount of fluid that has ever been injected into the vein of a cholera patient; nor yet the largest amount of fluid that has been known to be lost during the disease.

“Speaking from general observation, however, I may say that the largest amount of fluid I have ever heard of as having been injected into a vein in the course of a case, is from seven to ten pounds, and the most I have ever seen

injected is from three to four pounds ; while I have known a cholera patient to pass off by one vomit from two to three pounds, and repeat this many times in the course of three or four hours.

"In contemplating the subject of transfusing watery matter into the system after the modes I have described, the question occurred to me, whether we ought to confine ourselves to these modes ; or whether any other means existed of introducing fluid matters into animal bodies in very large quantities, and in a manner which should secure their absorption. This thought led me to look back upon the pathological characters and treatment of those diseases in which serum is largely thrown out into serous cavities or cellular tissue. I recollected that, in cases of this class (dropsical cases), not only were several gallons of fluid often thrown out of the circulation into the system without immediate danger, but that patients thus situated could tolerate a degree of purgation which would absolutely destroy healthy individuals.

"The idea furnished an important suggestion ; and I consequently commenced a series of experiments on animals, which, as they are as yet in an imperfect state, I shall only describe in general terms, reserving the particulars for my next report.

"The experiments up to this time have mainly consisted in exhausting dogs and cats by starvation and violent purgation with large doses of elaterium, and afterwards injecting either their peritoneal cavities or their cellular tissue with large quantities of distilled water, at the blood temperature. The results, in general terms, are as follows :—

"I find that either into the peritoneal cavity, or into the cellular tissue, a quantity of water, varying from a tenth to a fifth part of the weight of the animal may be injected with little risk. The effect of this is to induce a sleepy condition, which lasts from twenty to thirty hours, long before which time all trace of the injection is lost. If more than this is thrown in, the sleep or rather torpor (for the animal only remains quiet, and rouses when spoken to), ends in death.

"Setting aside casualties, I infer from my experiments as they now stand, that into the peritoneum or the cellular tissue of a patient in a proper state of collapse from cholera, water to the extent of at least a tenth, or even a fifth, part of the whole weight of the body might be injected with safety ; and that the absorption would be almost immediate.

"The performance of the operation for producing this artificial dropsy is exceedingly simple. The instruments required are simply a scalpel, lancet, or trocar, a common catheter, and an ordinary enema syringe. If the cellular tissue is to be injected, a deep puncture is made with a lancet in some fleshy part, the abdomen is the best, and the blunt point of the catheter is then introduced, and wedged sufficiently far into the cellular substance to allow the skin around it to be firmly grasped, so as to keep it steady in its place. The other end of the catheter being connected with the enema pump, an assistant very gradually throws in the fluid, and, as the tissue distends, gentle compression may be made with the hand so as to force on the fluid under the skin.

"As yet I have had no favourable opportunity of trying the suggestion I have here thrown out in cholera ; but that it might be put into application in desperate cases, and might prove advantageous, I have no doubts whatever. The advantages of it would be :—

"First. That an abundant store of fluid would be supplied, which the exhausted circulating system would rapidly and effectually take up.

"Second. That as this imbibition would take place through the capillary system, the fluid would enter the veins freely charged with the solid constituents of the blood, and would pass to the lungs in a condition suitable for respiration.

"Third. That the process would in no way interfere with the administration by the mouth of astringent solutions, or such other medicines or liquids as the practitioner might consider indicated.

"But, although I am thus sanguine on this subject, I wish it to be understood that the first trial of this process should commence in a case where the

patient is in the last stage of collapse, where other remedies have failed, and where death is imminent.

"I should scarcely omit to refer, in conclusion, to the fact (though it is one pretty generally understood), that impostors, in feigning diseases, have been known to inflate their own cellular tissue or that of their children with air, without any harm following; and the authors of the article, 'Feigned Diseases,' in the *Cyclopædia of Medicine*, make special reference to the statement, that some French conscripts were known to inject water into their own peritoneal cavities to produce a factitious ascites; while numerous instances have lately been recorded, in which, after the operation of tapping, such irritating substances as iodine and brandy have been thrown into the peritoneum without leading to fatal results."

28. *Injections of Milk or Milk and Water into the Peritoneal Cavity or Cellular Tissue, or Venous System in Collapse of Cholera.* By WM. BIRD HERAPATH, M. D.—In a paper read to the East Surrey Cholera Society, and published in the last number of the *Association Journal*, by Dr. Richardson, a proposal is made to inject the peritoneum and cellular tissue of cholera patients in the stage of collapse with large quantities of water, for the purpose of rapidly supplying the loss of serum experienced by the excessive discharges from the intestinal mucous membrane. This extremely philosophical and ingenious suggestion is certainly highly deserving of a mature consideration, and a careful digest of properly conducted experiments. But it has occurred to me, whilst reading these remarks, that the injection of a fluid more closely approaching the character of serum in its chemical constitution, would be more likely to give permanent benefit, and avoid the chances of destruction of the blood-corpuscles, occasioned by the difference existing between the specific gravity of their contents and of the rapidly imbibed water.

The most readily obtained liquid, having all the qualities we can desire, is most assuredly cow's milk; it is always at hand in any quantity, whilst its tendency to coagulate may be obviated by adding a little solution of carbonate of soda or potassa; perhaps about one scruple of the salt to a pint of milk would be sufficient.

The only difficulties about the matter would be the adulterations to which it may be subjected by fraudulent dealers, and the accidental presence of foreign bodies.

The entrance of foreign bodies into the circulation, or into the cavity of the peritoneum, or the meshes of the cellular tissue, may be easily prevented by attaching a fine muslin or gauze filter, or sieve, to the mouth of the injecting syringe. It remains to be proved whether this fluid would be absorbed by the peritoneal vessels as readily as water, or with sufficient facility to be of service.

The specific gravity of good pure milk varies from 1.041 to 1.033 or 1.020; serum varies from 1.026 to 1.037, and even 1.050, according to the presence of health or disease. Now to produce the difference in specific gravity required by the laws of endosmosis to act in a state of health, water may be added to the milk. But the *viscosity of cholera blood* would assuredly indicate an increase in the specific gravity, and no dilution would be *necessary* in this disease; but if it were adulterated with water only, it would be a matter of no great importance.

It seems highly probable that milk, or milk and water, would be a much more successful fluid for this purpose than water only, and would certainly offer many great advantages, especially if the injection were to be made directly into the venous system, as the corpuscles of the blood do not suffer any material alteration in form, when examined microscopically, after dilution with milk; they suffer nothing from the admixture, especially if the milk is obtained from an animal of the same kind as the blood experimented on, and if the milk used be pure and unmixed with water.

I apprehend also that the introduction of an albuminous constituent is essentially necessary, to supply the waste of this vital pabulum experienced during the exhaustive discharges of this disease.